

A structured approach to breast imaging in Uganda

Zeridah Muyinda and colleagues describe the relevance, status and shortcomings of breast imaging in Uganda

Radiology and imaging in Uganda has been growing steadily. The first x-ray unit was constructed at Mulago Hospital from 1950 to 1952; 10 years later a well-equipped Department of Radiology was opened in New Mulago.¹ Breast imaging has advanced over the years, but Uganda still lags behind as it has no screening programme, unlike many developed countries.

Unfortunately, there is an increase in breast disease including the most widely feared: breast cancer. The incidence of breast cancer in Uganda tripled from 11 per 100,000 in 1962 to 31 per 100,000 in 2006.² Breast cancer is now the third commonest cancer in women in Uganda.^{3,4} This is also true for Asia, where breast cancer is one of the most frequent cancers in women.⁵

In 2003, the Uganda breast cancer working group comprising of surgeons, radiologists, radio-oncologists and radiotherapists compiled breast cancer guidelines. Updated in 2008, their aim was to improve the quality of life for breast cancer patients and their families, harmonise treatment and referral of patients and develop a reference document for health workers managing breast cancer. They also aimed at improving the awareness of breast cancer among health workers and the community and have a National Cancer Society.⁶

Training

There have been efforts to improve the expertise of the radiology workforce of radiologists, radiographers and sonographers through education and training. The discipline of Radiology and Imaging has several professional bodies through which it trains and disseminates updated radiology information. From 2013-2018, 3 conferences were held under the theme; breast imaging. Lectures and hands on sessions were given by international visiting professors to improve the skills of Ugandans in Breast Imaging. In November 2016, during the annual scientific conference the Breast Imaging and Reporting System BIRADS was launched. Since then a lot of training on the BIRADS system has been undertaken. Many articles on breast imaging have been published. This has provided an opportunity to prepare well placed interventions to improve breast imaging in Uganda.

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Research

The authors searched for papers on breast imaging in Uganda published between 2014 and 2020. Further: literature on breast imaging and related data were reviewed; the curricula for Master of Medicine (M.Med) Radiology 2010 to 2019 of the College of Health Sciences Makerere University were retrieved; the course content for Clinical Radiology and Imaging of Women's health was reviewed; course objectives related to breast imaging were extracted; M.Med Radiology theses from Makerere University between 2010 and 2020 were also retrieved from the library of the Radiology Department; research theses on breast imaging were extracted, listed and reviewed; registers and records of the annual scientific conferences of Uganda Society for Advancement of Radiology and Imaging USOFARI, Association of Radiologists of Uganda ARU, Uganda Society for sonography UGASON; information of the preconference workshops, conference themes, sub themes, conference objectives, scientific talks and hands on session were looked at.

The search revealed that there were 13 papers published on breast imaging from 2014 to 2020. The authors spanned a wide range of affiliations, with their collaboration important for the advancement of breast imaging in Uganda.

The M.Med Radiology Curriculum 2010–2020 review revealed that breast imaging was taught under the course on Clinical Radiology and Imaging of Women's Health done by second-year radiology residents in their second semester. The extracts on breast imaging revealed the course objectives included discussion of breast imaging examinations and description of breast imaging pathology using BIRADS. The course outline requirements for the radiology resident included performing 40 mammograms, 20 breast ultrasound scans, 2 Galactograms, and radiological interpretation of breast lesions using BIRADS. Among the publications were three theses of M.Med Radiology on research related to breast imaging.

Three out of six annual scientific conferences for Radiology and Imaging professional societies/associations were related to breast imaging. The Association of Radiologists (ARU), Uganda Society for Advancement of Radiology and imaging (USOFARI) and Uganda Association of Sonography had conferences on Breast Imaging in 2013, 2016 and 2018 respectively.

Breast medical imaging equipment

Breast imaging in Uganda is currently performed with ultrasound and mammography equipment. There is only one private imaging centre that does MRI mammography examination. An audit done on registered radiology equipment resources in 2020 showed that Uganda has 20 registered mammography machines, of which 75% are in the central region and 60% are in private health units. The authors compared the distribution of mammography equipment per million population and found the distribution to be 0.5 for Uganda, 0.8 for Tanzania, 5.0 for South Africa and 0.8 for Zimbabwe. The National Medical Equipment policy dictates that ultrasound and general radiography equipment should be available from the level of Health Centre IV. This is a health unit which serves approximately 100,000 people.⁸ Ultrasound services are fairly accessible both in public and private health units as well urban and rural areas. Ultrasound is the dominant imaging service for breast health care. Magnetic resonance imaging is rarely used for breast health diagnostics in Uganda.

This reflects the situation of low access of mammography services in the country. Most sub-Saharan countries have an overwhelming shortage of mammography services. Though mammography screening is known to reduce mortality of breast cancer, Uganda does not have it. In its absence, alternative screening tests should be sought from the available resources, in line with evidence-based breast health guidelines.

Currently there is a change in practice, using ultrasound as a primary screening tool in women with breast dense tissue.⁹ This is also true for Uganda, where Okello et al found supplementary breast ultrasound scans detected 27% more malignant mass lesions which otherwise had been missed by mammography, among these symptomatic women with mammographically dense breasts.¹⁰ There is a mounting evidence that ultrasound is an important tool for diagnosis and screening breast disease.

In a low-income country like Uganda where ultrasound is widely available and relatively inexpensive, it has been recommended for use as a screening tool.¹¹ It is time to plan for innovations in ultrasound technology and procurement of ultrasound equipment with software like computer-aided detection (CAD), elastography and the use of contrast agents to improve on diagnostic accuracy in breast disease. There should be other readily available and acceptable options in the absence mammography and ultrasound screening. In South Africa, clinical breast examination is used for index screening.¹⁴ This is what is also recommended for Uganda.⁶

Human resources for breast imaging

Breast imaging practitioners include radiologists, radiographers and sonographers. In 2012, radiologists numbered 38, radiographers 150 and sonographers 300; 78% percent of the radiologists and 50% of the radiographers were based in the capital, Kampala, while 76% of the sonographers were in rural areas.¹²



Mammography machine in Benin

This study on training for rural radiology and imaging in Sub-Saharan Africa highlights a mismatch between services and population and revealed disparities of rural radiology which need to be addressed.

Mammograms are exclusively interpreted by radiologists while breast ultrasounds are interpreted by radiologists, radiographers and sonographers. Both services are predominantly diagnostic.

For breast imaging to have a meaningful impact, the breast imaging practitioners must have knowledge, skills and competences and the number must be adequate. This was further highlighted by an article that reported a radiologist-to-patient ratio of 1:300,000 and sonographer-to-patient ratio of 1:150,000.¹¹ Another pilot study at Nawanyago HCIII, found that breast ultrasound done by certified sonographers reduced the number of referrals by 75% and was appropriate resource in downstaging breast cancer.¹²

Scheel et al in 2020 reported that in order to improve the diagnostic capacity for early detection of breast cancer, task shifting of specialists to non-specialist for basic interpretation (abnormal vs normal) would go a long way to improving breast imaging coverage in the country.¹³

Radiology professional bodies have been effective platforms to train, upskill and disseminate updated radiology information through annual scientific conferences. The adoption of BIRADS by breast-imaging practitioners in Uganda is meant to improve breast-imaging reporting. BIRADS report forms and templates have been introduced in a number of health facilities and are widely used.

Although there is an increase in the numbers of medical imaging practitioners there is still room for training and ensuring equitable coverage of the urban and rural health facilities. Where there is inequitable human work force coverage, especially for specialised expertise, teleradiology could be an option.

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BI-RADS ® and Management

- BI-RADS 0 (BR0):** Incomplete. Needs additional imaging (e.g. mammogram).
- BI-RADS 1 (BR1):** Negative. This is a normal examination. Clinical follow-up.
- BI-RADS 2 (BR2):** Benign finding (e.g. cyst, normal lymph node). Clinical follow-up.
- BI-RADS 3 (BR3):** Probably benign finding (e.g. fibroadenoma). Short-interval follow-up.
- BI-RADS 4 (BR4):** Suspicious finding. Needle aspiration/biopsy.
- BI-RADS 5 (BR5):** Highly suspicious finding. Needle aspiration/biopsy.
- BI-RADS 6 (BR6):** Known malignancy. Surgical excision when appropriate.

Structured approach to breast imaging

A structured approach to breast imaging itemises the components which contribute to it. These include medical equipment, human resource, breast imaging service delivery, health information on breast imaging, finances, governance and leadership. This approach provides in-depth knowledge of imaging and how each component affects it.

The Uganda Breast Cancer Working Group guidelines recommend diagnostic mammography for symptomatic patients over 25 years. The BISM system was used for reporting mammography images. Normal mammogram was scored 1, benign lesion 2, Indeterminate 3, suspicious 4 and malignant 5.6 For all those years, breast images were interpreted based on the BISM system.⁶ Later there was adoption and adaption of BIRADS for interpretation of mammography and breast ultrasound by the breast imaging practitioners of Uganda after its launch during USOFARI 2016 annual scientific conference. Since then, the use BIRADS report forms or template has become popular in health facilities. Several published studies have tested BIRADS for interpretation. In 2019 a non-published study done on 'Inter-observer agreement in BIRADS classification of breast masses among ultrasonography performers at Mulago National Referral Hospital' revealed that the radiologists and radiographers had fair to good agreement for terminology descriptors and final categorisation. In 2020, another thesis (unpublished) entitled 'Utilization of BIRADS Ultrasound Lexicon Among Ultrasound Practitioners and Clinicians', showed more than 50% utilisation of BIRADS US lexicon in Mulago hospital. It also revealed that the concordance of BIRADS descriptors with BIRADS classification was poor with a moderate agreement, while the concordance of clinicians' management with BIRADS recommendation was substantial with a moderate agreement. The two studies show that the BIRADS is fairly well used for interpretation. This was crucial for the breast imaging practitioners to assess

their consistency and reliability in classifying breast masses on ultrasound. There is still a need to train the breast imaging practitioners on the terminology descriptors and final categorisation. Interdisciplinary CME would also increase the concordance of clinician's management with BIRADS recommendation. Standardising of the report language is a right step towards quality breast imaging. Several authors have reported the role of screening breast ultrasound in mammographically dense breasts.⁹

Governance, leadership and finances

There is little emphasis on governance and leadership or finances for breast imaging in Uganda. However, a well-rounded group with the right stakeholders who have shared objectives can greatly improve performance. An example is the Uganda Cancer Working Group.⁶

Other than the performing breast imaging, medical imaging practitioners need to have knowledge on the finances. This information helps practitioners plan, acquire and use resources effectively and make smart decisions on which equipment to procure, the amount of consumables required and human resource to train.

Conclusion

Breast imaging in Uganda is making strides. A structured approach to breast imaging identifies its different components. This paper has shown the relevance, status and challenges of breast imaging in relation to radiology equipment, human resources, service delivery, health information, finances, governance and leadership. The onus is on the stakeholders to address each component with the appropriate interventions.

References

1. MG Kawooya Association of Radiologists of Uganda. The Radiology Link 1ssue 4 2014
2. Parkin DM, Namboozee S, Wabwire-Mangen F, Wabinga HR. Changing cancer incidence in Kampala, Uganda, 1991–2006. *International journal of cancer*. 2010;126(5):1187-95. <https://www.ncbi.nlm.gov>
3. Galukande M, Mirembe F, Wabinga H. Patient delay in accessing breast cancer care in a sub Saharan African country: Uganda. *Br J Med Med Res*. 2014, 4: 2599-2610. doi: 10.9734/BJMMR/2014/7293#sthash.PglzE4b6.dpuf
4. Bhurgri Y, Bhurgri A, Nishtar S, et al. Pakistan - country pro-file of cancer and cancer control 1995-2004. *J Pak Med Assoc*. 2006;56(3):124–130. [PubMed] [Google Scholar]
5. A Gakwaya 1, M Galukande, A Luwaga, et al Uganda Cancer Working Group Breast cancer guidelines for Uganda (2nd Edition 2008) *Afr Health Sci* 2008 Jun;8(2):126-32.
6. Elsie Kiguli-Malwadde et al. An audit of registered radiology equipment resources in Uganda. *Pan African Medical Journal*. 2020;37(295). 10.11604/pamj.2020.37.295.22046
7. Ministry of Health Republic of Uganda. Health Sector Development Plan 2015/16 - 2019/20. Accessed September 16, 2019.
8. Jocelyn A Rapelyea, Breast Ultrasound Past, present and future Dec 20th 2017 DOI:10.5772/intechopen.6970.
9. Okello et al. Breast cancer detection using sonography in women with mammographically dense breasts *BMC Medical Imaging* (2014) 14:41 DOI 10.1186/s12880-014-0041-0.
10. M Galukande Rethinking breast cancer screening strategies in low resource. *Afr Health Sci* 201 Mar, 10(1) 89-92 PMID 20811531
11. Matovu A et al. Pilot study of a resource-appropriate strategy for downstaging breast cancer in rural Uganda. *J Glob Radiol*. 2016;2(1): Article 1
12. John R Scheel et al Breast Cancer Early Detection and Diagnostic Capacity in Uganda DOI: 10.1002/cncr.32890, Received: January 24, 2020; Revised: February 24, 2020; Accepted: February 25, 2020, Published online April 29, 2020 in Wiley Online Library
13. Schoub P. Breast cancer imaging in South Africa in 2018. *S Afr J Rad*. 2018;22(2), a1666. <https://doi.org/10.4102/sajr.v22i2.1666>.